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UNIT 4 - Session 7
React

Session 6 Summary

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1. React routes
2. React web pages
3. Fragments
4. Form Management
5. Controlled Components
6. Continued with the Bookcase App

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Goals for Unit 4 - Session 7

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1. What is an API?
2. Public APIs
3. RESTful APIs
4. Google Book API and how to connect to it
5. Fetch API
6. React Bootstrap

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What is an API?

What is an API?

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- API stands for Application Programming Interface
- An API is software that sits in-between two applications and allows them to talk to each other
- APIs allow us to share important data and expose practical business functionality between devices, applications, and individuals
- One of the chief advantages of APIs is that they allow the abstraction of functionality between one system and another
- APIs enable developers to make repetitive yet complex processes highly reusable with a little bit of code

Public APIs

Why is it helpful to know what an API is and how to consume one?

- Most public application have APIs that can be consumed by external programs nowadays

- Facebook, Twitter, Instagram, Meetup, Eventbrite and many more will allow you to search or request data from their system which can enhance any application you are building

Why would they allow this?

- Allow this extends the reach of an application by allowing third-party developers to easily and safely build extended programs

Public APIs

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- There are a number of open APIs available for developers to query
- Most APIs will require you to sign up and get an API key to use
- Some interesting Public APIs:

https://github.com/public-apis/public-apis

- The link contains a list of over 100 public APIs that can be used in your projects. It contains APIs that return data on anything from animals, food, government and weather
- The majority of APIs available will be **RESTful** APIs though other architectures exists

What are RESTful APIs?

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- REST or RESTful API (stands for **RE**presentational **S**tate **T**ransfer)
- REST is designed to take advantage of existing web protocols
- REST Services are generally stateless, meaning the server does not store any data about the client session on the server
- The client session information is stored by the client
- Other API architectures exist such as SOAP (**S**imple **O**bject **A**ccess **P**rotocol)
- We'll cover the specifics of APIs in more detail in the Node.js course
- Next we will be looking specifically at the RESTful Google Book API

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Google Book API

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Google Book API

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- The Google Books API is Google's effort to make book content more discoverable on the Web
- Using the Google Books API, your application can perform full-text searches and retrieve book information, viewability and eBook availability
- You can also manage your own personal bookshelves
- Most calls to the Google API require authentication using an API key
- Performing a search does not require authentication, so you do not have to provide the Authorization header with a request to the API
- We'll be using the Fetch API to make request to the Google Book API

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Google Book API

- The Google Books API returns JSON in the same format as the books.json file. Entering the following URL into a browser window will result in a list of books about food:
  https://www.googleapis.com/books/v1/volumes?q=food&filter=paid-ebooks&print-type=books&projection=lite


```
{
  "kind": "books#volumes",
  "totalItems": 1730,
  "items": [
    {
      "kind": "books#volume",
      "id": "_t0IoTcVxIIC",
      "etag": "M+sHQ1WlR64",
      "selfLink": "https://www.googleapis.com/books/v1/volumes/_t0IoTcVxIIC",
      "volumeInfo": {
        "title": "The Psychology of Food Choice",
        "authors": [
          "Richard Shepherd","Monique Raats"],
        "description": "One of the central problems in nutrition is ...",
       ...
```


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Exercise 1

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Exercise 1: Adding a Search Form

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- We are going to add search capabilities to our bookcase app. First we will need to add a search form to the existing app

1. Open the **mybookcase** app

2. Create a new component file called **Search.js** and place it in the components folder

```
> cd mybookcase/src
> echo . > Search.js
```


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Exercise 1: Adding a Search Form

3. Open **Search.js** in Visual Code. Add a React functional component called Search

```
import React from 'react';
const Search = (props) => {
  return <div> ...Add input/submit button here </div>
}
export default Search;
```

4. Return a form from the Search component. The form should contain an input field to collect the search term entered by a user and a submit button

5. Add a reference to your Search component in your **Header.js** file e.g.

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Exercise 1: Adding a Search Form

```
<Route exact path="/" render={() => (
    <>
      <Header/>
      <Search />
      <BookList />
    </>
)} />
```

6. Run the code from the terminal to ensure the form is returned (e.g. `> npm start`)

7. Ensure the input field is a controlled component by setting the value of the input field to a props attribute passed in by the calling component e.g.

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Exercise 1: Adding a Search Form

```
<input type="text" value={keyword} onChange={(e)
=>setKeyword(e.target.value)}/>
```

8. You will need to call a function called **setKeyword** which is returned by the **useState** hook e.g.

```
const [keyword,setKeyword] = useState('');
```

9. To test if the **setKeyword**() function is working, you can display the results of the keyword somewhere on the form e.g.

```
<form>
  <h1>{keyword && 'Searching for keyword:' + keyword}</h1>
...The rest of your form fields e.g.<input/> <button/>
</form>
```


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Checkpoint!

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How are you feeling?

RED - I have no idea what you're talking about.

YELLOW - I have some questions but feel like I understand some things.

GREEN - I feel comfortable with everything you've said.

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Using Fetch in React

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Fetch in React

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- Consuming REST APIs in a React Application can be done in various ways
- We'll be looking at the Fetch API which is an in-built browser web API that provides an interface for fetching resources
- A fetch function is now provided in the global window scope, with the first argument being the URL.

Syntax: `fetch(<some API endpoint URL>, {method: <get|post|put|delete>});`

e.g. `fetch('https://www.example.com/some/url', {method: 'get'});`

- We'll cover request methods in detail in the next course. There a few different methods you can use - we will mainly be using the GET method

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Fetch in React

- The call below is an example of using the fetch API to search the Google API for books about 'food':

```
const term = 'food';
const results = await
fetch(`https://www.googleapis.com/books/v1/volumes?q=${term}&filter=paid-ebooks&print-type=books&projection=lite`).then(res => res.json());
```

- The GET method is the default so doesn't have to be specified
- The term food is being interpolated into the URL
- The call above also uses Javascript promises to handle requests/callbacks.

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Fetch in React

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- The response is a JSON list of books

- To call the Google API from our Bookcase app we can add a function called **`findBooks()`** in our App.js file which will update a state variable called **books** via a **`setBooks()`** function

```
import data from './models/books.json';
const [books, setBooks] = useState(data);

async function findBooks(value) {
    const results = await
fetch(`https://www.googleapis.com/books/v1/volumes?q=${value}&filter=paid-ebooks&print-ty
pe=books&projection=lite`).then(res => res.json());
   if (!results.error) {
     setBooks(results.items);
   }
}
```


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Fetch in React

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- The promises/async/await pattern is a syntax that enables asynchronous, non-blocking functions to be structured in a way similar to synchronized functions

- Synchronous code is executed in sequence – each statement waits for the previous statement to finish before executing.

- Asynchronous code doesn't have to wait – your program can continue to run. You do this to keep your site or app responsive, reducing waiting time for the user

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Exercise 2

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Exercise 2: Search Google Book API

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- The search will take a text input from a user and search the Google Books API for a list of books that match the term

- The results of the search will be displayed to the user. Each book will have an "Add" button to enable a user to add the book to a personal list of books

1. Open the **mybookcase** app. Open the App.js file in Visual Code

2. Add a function called **findBooks()** which calls the Google Book API using the fetch API

3. In your **findBooks**() function in the **App.js** ensure it takes a variable which will be set/sent from the Search component

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Exercise 2: Search Google Book API

4. You will need to pass the function **findBooks** down to the Search component via its attributes

```
<Search findBooks={findBooks}/>
```

- Google Books API endpoint:

```
const value = 'food';
https://www.googleapis.com/books/v1/volumes?q=${value}&filter=paid-ebooks
&print-type=books&projection=lite
```

- This endpoint currently filters on paid-ebooks, print-type: books and projection: lite

- For more details of the API visit the homepage: https://developers.google.com/books/docs/v1/reference/

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Exercise 1: Search the Google API

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5. In your Search.js file add a method to handle the form submit, e.g. onSubmit={handleSubmit}

6. In the handleSubmit method remember to prevent the form form posting a request by calling event.preventDefault()

```
<form onSubmit={handleSubmit}>...</form>

const handleSubmit = (event) =>{
  event.preventDefault();
  props.findBooks(props.keyword);
};
```


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Exercise 1: Search the Google API

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7. You will need to lift the state of the **keyword** field up to the App.js and pass it back down to the Search component via the attributes e.g

```
<Search findBooks={findBooks} keyword={keyword} setKeyword={setKeyword}/>
```

8. Update the form elements in Search.js and set the text field's value attribute to **props.keyword** and call the **props.setkeyword()** from the onChange e.g.

```
<input value={props.keyword} onChange={(e) =>
props.setKeyword(e.target.value)}/>
```

9. Ensure the books list is updated with the return value from the Google Books API

10. Test your app by running the npm start command

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React Bootstrap

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React Bootstrap

- There are a number of React libraries that you can incorporate into your applications to help improve the look and feel or enhance the functionality of your site

- Bootstrap is a free and open-source CSS framework directed at responsive, mobile-first front-end web development

- It contains CSS- and JavaScript-based design templates for typography, forms, buttons, navigation, and other interface components

- The React-Bootstrap library will give you access to a number of pre-built components as well as css classes for styling your applications

- For a comprehensive list of components visit the react-bootstrap component library page: https://react-bootstrap.github.io/components

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React Bootstrap

- NPM can be used to add the React Bootstrap package to your React application

```
> npm install react-bootstrap bootstrap
```

- Once installed you can reference the React-bootstrap css from your App.js file

```
import 'bootstrap/dist/css/bootstrap.min.css';
```


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React Bootstrap

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- You can also import individual components like react-bootstrap/Button rather than the entire library

```
import Button from 'react-bootstrap/Button';

import { Button } from 'react-bootstrap';
```

- Doing so pulls in only the specific components that you use, which can significantly reduce the amount of code you end up sending to the clien

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React Bootstrap

- Reference your imported component in your functional component e.g.

```
const Example = ({ props }) => {

  return  <>
          <Button className="btn-default">Default Button</Button>
          <Button className="btn-warning">Warning Button</Button>
          <Button className="btn-info">Info Button</Button>
          <Button className="btn-danger">Danger Button</Button>
          <Button className="btn-success">Sucess Button</Button>
          <Button className="btn-dark">Dark Button</Button>
          <Button className="btn-light">Light Button</Button></>
}
export default Example;
```

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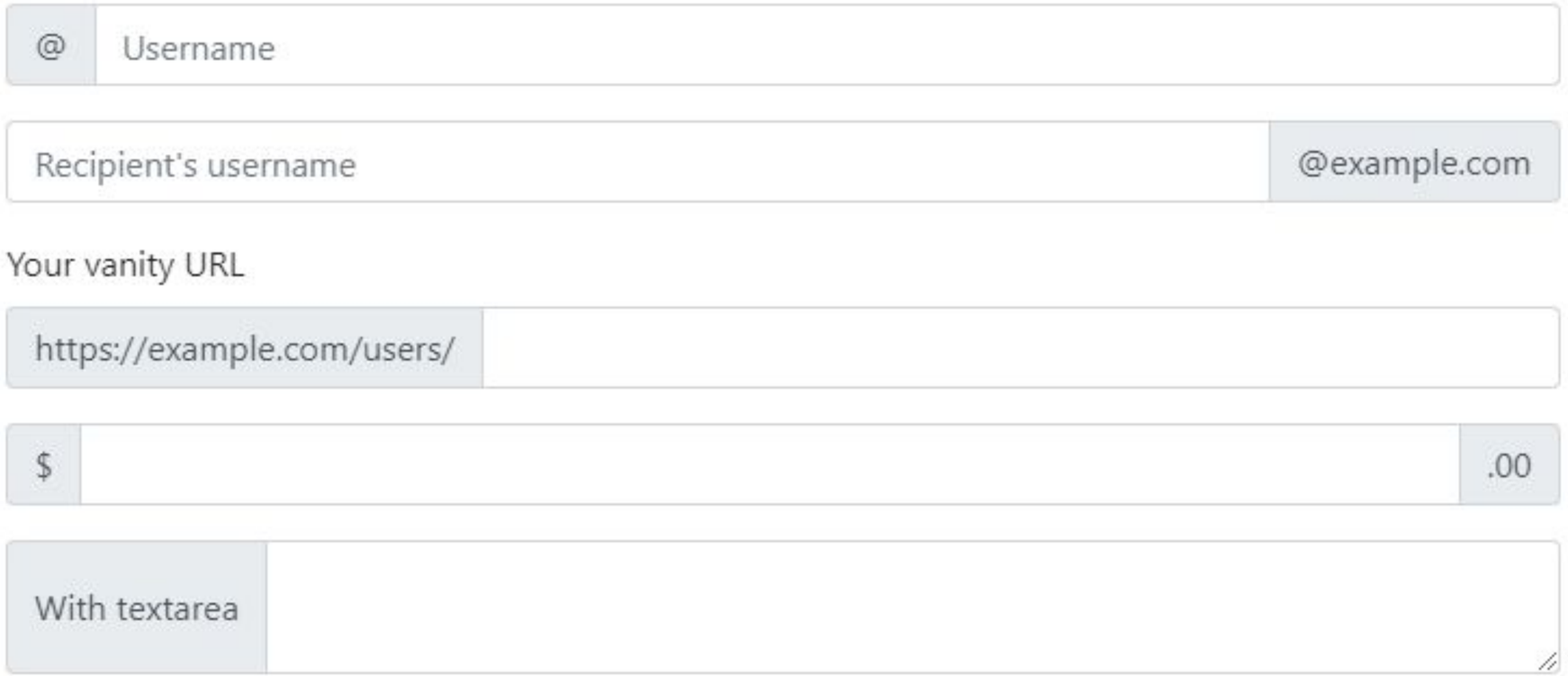
React Bootstrap

- There are a number of classes and components that can be added to improve the usability of forms and input fields: e.g.



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Exercise 1

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Exercise 3: Adding Bootstrap

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- We are going to add react-bootstrap to our library to improve the look-and-feel of the app

1. Open the **mybookcase** app

2. Navigate to the application from the terminal/command line and run the install command

```
> npm install react-bootstrap bootstrap
```

3. Add a reference to the bootstrap css library to the App.js file e.g.

```
import 'bootstrap/dist/css/bootstrap.min.css';
```


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Exercise 3: Adding Bootstrap

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4. Update your form elements. Change them to bootstrap input fields

```
<Form>
  <Form.Group controlId="searchKeyword">
    <Form.Label>Enter Search</Form.Label>
    <Form.Control type="keyword" placeholder="Enter keyword" />
  </Form.Group>

  <Button variant="primary" type="submit">
    Submit
  </Button>
</Form>
```

5. Add the findBooks(), HandleSubmit() and keyword attributes and events to ensure your Bootstrap form works with your exisiting code

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Checkpoint!

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Summary of Session 7

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